Leica Rugby 840
User Manual

Version 1.0
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on the purchase of a Leica Rotating Laser product.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "1 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.

Product identification

The type and serial number of your product are indicated on the type plate.
Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type: _____

Serial No.: _____

Validity of this manual

This manual applies to the Rugby 840 lasers. Differences between the models are marked and described.

Available documentation

Name	Description/Format		
Rugby 840 Quick Guide	Provides an overview of the product together with technical data and safety directions. Intended as a quick reference guide.	✓	✓
Rugby 840 User Manual	All instructions required in order to operate the product to a basic level are contained in the User Manual. Provides an overview of the product together with technical data and safety directions.	-	✓

Refer to the following resources for all Rugby 840 documentation/software:

- the Leica Rugby CD
- https://myworld.leica-geosystems.com

myWorld@Leica Geosystems (**https://myworld.leica-geosystems.com**) offers a wide range of services, information and training material.
With direct access to myWorld, you are able to access all relevant services whenever it is convenient for you, 24 hours a day, 7 days per week. This increases your efficiency and keeps you and your equipment instantly updated with the latest information from Leica Geosystems.

Service	Description
myProducts	Simply add all Leica Geosystems products that you and your company own. View detailed information on your products, buy additional options or Customer Care Packages (CCPs), update your products with the latest software and keep up-to-date with the latest documentation.
myService	View the service history of your products in Leica Geosystems Service Centers and detailed information on the services performed on your products. For your products that are currently in Leica Geosystems Service Centers view the current service status and the expected end date of service.
mySupport	Create new support requests for your products that will be answered by your local Leica Geosystems Support Team. View the complete history of your Support and view detailed information on each request in case you want to refer to previous support requests.
myTraining	Enhance your product knowledge with the Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material or download training material on your products. Keep up-to-date with the latest News on your products and register for Seminars or Courses in your country.

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1 Safety Directions

1.1 General

Description

The following directions enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

About Warning Messages

Warning messages are an essential part of the safety concept of the instrument. They appear wherever hazards or hazardous situations can occur.

Warning messages...

- make the user alert about direct and indirect hazards concerning the use of the product.
- contain general rules of behaviour.

For the users' safety, all safety instructions and safety messages shall be strictly observed and followed! Therefore, the manual must always be available to all persons performing any tasks described herein.

DANGER, **WARNING**, **CAUTION** and **NOTICE** are standardized signal words for identifying levels of hazards and risks related to personal injury and property damage. For your safety it is important to read and fully understand the table below with the different signal words and their definitions! Supplementary safety information symbols may be placed within a warning message as well as supplementary text.

Type	Description
⚠ **DANGER**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in appreciable material, financial and environmental damage.
☞	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

1.2 Definition of Use

Intended use

- The product casts a horizontal laser plane or a laser beam for the purpose of alignment.
- The laser beam can be detected by means of a laser detector.
- Remote control of product.
- Data communication with external appliances.

Reasonably foreseeable misuse

- Use of the product without instruction.
- Use outside of the intended use and limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with recognisable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the working site.
- Deliberate dazzling of third parties.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.

1.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

DANGER

Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product.

1.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a safe condition.

Person responsible for the product

The person responsible for the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To ensure that it is used in accordance with the instructions.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of e.g. radio transmitters, lasers are respected.

CAUTION

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

DANGER

Because of the risk of electrocution, it is dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

NOTICE

With the remote control of products, it is possible that extraneous targets will be picked out and measured.

Precautions:

When measuring in remote control mode, always check your results for plausibility.

WARNING

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.

Precautions:

Do not use the product in a thunderstorm.

WARNING

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

Precautions:

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.

CAUTION

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people can sustain injury.

Precautions:

When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the product to mechanical stress.

CAUTION

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

Precautions:

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

WARNING

During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

Precautions:

The person responsible for the product must make all users fully aware of the existing dangers.

WARNING

If you open the product, either of the following actions may cause you to receive an electric shock.

- Touching live components
- Using the product after incorrect attempts were made to carry out repairs

Precautions:

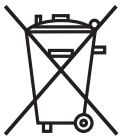
Do not open the product. Only Leica Geosystems authorised service workshops are entitled to repair these products.

WARNING

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:



The product must not be disposed with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorised personnel.

Product-specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems dealer.

WARNING

Only Leica Geosystems authorised service workshops are entitled to repair these products.

WARNING

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

Precautions:

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

WARNING

If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metalized paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets.

Precautions:

Make sure that the battery terminals do not come into contact with metallic objects.

1.6 Laser Classification

1.6.1 General

General

The following chapters provide instructions and training information about laser safety according to international standard IEC 60825-1 (2007-03) and technical report IEC TR 60825-14 (2004-02). The information enables the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.

☞ According to IEC TR 60825-14 (2004-02), products classified as laser class 1, class 2 and class 3R do not require:

- laser safety officer involvement,
- protective clothes and eyewear,
- special warning signs in the laser working area

if used and operated as defined in this User Manual due to the low eye hazard level.

☞ National laws and local regulations could impose more stringent instructions for the safe use of lasers than IEC 60825-1 (2007-03) and IEC TR 60825-14 (2004-02).

1.6.2 Rugby 840

General

The rotating laser built into the product produces a visible laser beam which emerges from the rotating head.

The laser product described in this section is classified as laser class 2 in accordance with:

- IEC 60825-1 (2007-03): "Safety of laser products"
- EN 60825-1 (2007-10): "Safety of laser products"

These products are safe for momentary exposures but can be hazardous for deliberate staring into the beam. The beam may cause dazzle, flash-blindness and after-images, particularly under low ambient light conditions.

Rugby 840:

Description	Value
Maximum peak radiant power	2.7 mW ± 5%
Pulse duration (effective)	1.1 ms
Pulse repetition frequency	10 rps
Beam divergence	< 1.5 mrad
Wavelength	635 nm ± 10 nm

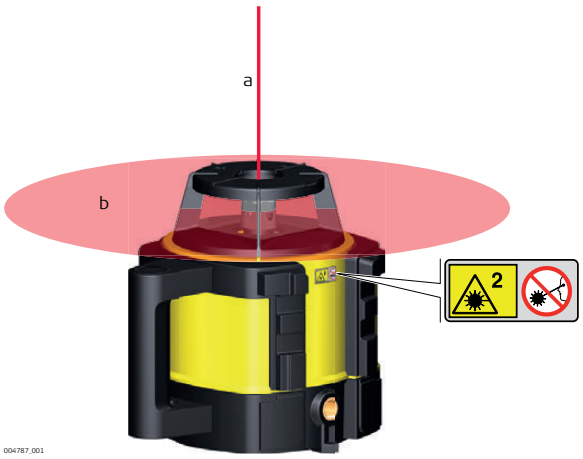
⚠ **CAUTION**

From a safety perspective, class 2 laser products are not inherently safe for the eyes.

Precautions:

1) Avoid staring into the beam.
2) Avoid pointing the beam at other people.

Labelling



a), b) Laser beam

Laser Radiation
Do not stare into the beam
Class 2 Laser Product
according to IEC 60825-1
(2007 - 03)

Po ≤ 2.70 mW

λ = 635 ± 10 nm

1.7 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

WARNING

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

CAUTION

There is a risk that disturbances may be caused in other equipment if the product is used with accessories from other manufacturers, for example field computers, personal computers or other electronic equipment, non-standard cables or external batteries.

Precautions:

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers or other electronic equipment, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

CAUTION

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

Precautions:

Check the plausibility of results obtained under these conditions.

CAUTION

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

Precautions:

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

Radios or digital cellular phones

WARNING

Use of product with radio or digital cellular phone devices:

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

Precautions:

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment can be disturbed or that humans or animals can be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

1.8 FCC Statement, Applicable in U.S.

The greyed paragraph below is only applicable for products without radio.

WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING

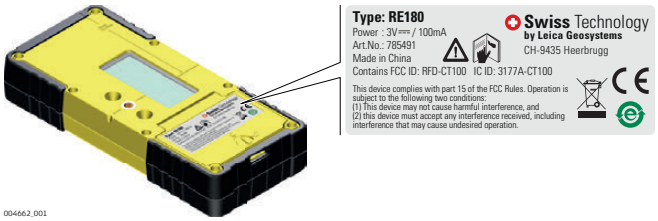
Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

Labelling Rugby 840

Leica
Leica Geosystems AG
CH-9435 Heerbrugg
PROTECT
by Leica Geosystems
Swiss Technology
Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice Nr. 50 July 24, 2007
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
Type: Rugby 840
Power : 8.4V⎓ / 0.5A
Art.No.: 795434
Made in China
Contains FCC ID: RFD-CT100 IC ID: 3177A-CT100
Serial Number: YWWY8402500
004788_001

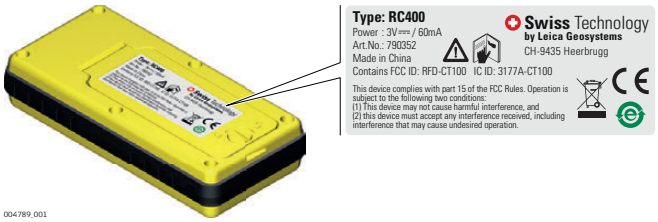
Labelling Rod Eye

Rod Eye 180


Type: RE180
Power : 3V⎓ / 100mA
Art.No.: 785491
Made in China
Contains FCC ID: RFD-CT100 IC ID: 3177A-CT100
Swiss Technology
by Leica Geosystems
CH-9435 Heerbrugg
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
004662_001

Labelling RC400

RC400


Type: RC400
Power : 3V⎓ / 60mA
Art.No.: 790352
Made in China
Contains FCC ID: RFD-CT100 IC ID: 3177A-CT100
Swiss Technology
by Leica Geosystems
CH-9435 Heerbrugg
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
004789_001

2 Description of the System

2.1 System Components

General description

The Rugby 840 is a laser tool for general construction and levelling applications such as

- Setting forms
- Checking grades
- Controlling depths for excavations

If set up within the self-levelling range, the Rugby automatically levels to create an accurate horizontal or vertical plane of laser light.
Once the Rugby has levelled, the head will start rotating and the Rugby is ready for use.
30 seconds after the Rugby has completed the levelling, the H.I. Alert system becomes active and protects the Rugby against changes in elevation caused by movement of the tripod to ensure accurate work.

Available system components

☞ The delivered components depend on the package ordered.

2.2 Rugby Laser Components

Rugby laser components

004791_001

a) Carry Handle
b) LED Indicators
c) Buttons
d) Battery compartment
e) Charge jack (for Li-Ion battery pack)

2.3 Case Components

Case components

004792_001

a) Rugby laser
b) RC400 Remote Control
c) Rod eye receiver mounted on the bracket
d) Li-Ion battery pack or Alkaline battery pack
e) 2x AA-cell battery
f) User Manual/CD
g) Second receiver (can be purchased separately)
h) 4 x D-cell battery (for alkaline versions only)
i) Charger (for Li-Ion versions only)

Location

- Keep the location clear of possible obstructions that could block or reflect the laser beam.
- Place the Rugby on a stable ground. Ground vibration and extremely windy conditions can affect the operation of the Rugby.
- When working in a very dusty environment place the Rugby up-wind so the dirt is blown away from the laser.

Setting up on a Tripod

Step	Description
1.	Set up the tripod.
2.	Place the Rugby on the tripod.
3.	Tighten the screw on the underside of the tripod to secure the Rugby on the tripod.

- Attach the Rugby securely to a tripod or laser trailer, or mount on a stable level surface.
- Always check the tripod or laser trailer before attaching the Rugby. Make sure all screws, bolts and nuts are tight.
- If a tripod has chains, they should be slightly loose to allow for thermal expansion during the day.
- Secure the tripod on extremely windy days.

2.5 RC400 Remote Control

Description

The RF Remote Control communicates with the Rugby via RC (radio) and is used to control the same functions as on the laser.

RC400 Remote Control panel

a) Sending LED
b) Scan mode button
c) Left and Right Arrow buttons
d) Up and Down Arrow buttons
e) Clockwise (CW) and Counter-clockwise (CCW) buttons
f) Scan 90° and Scan Memory button
g) Head Speed button
h) Automatic/Manual Mode button
i) Beam down button
j) Sleep mode button

Description of the Buttons

Button	Function
Scan Mode	Press to change width of the scanning motion.
Left and Right Arrow	Press to tilt the Y-axis when it is in Manual Mode. In the laydown position press to align the vertical plane and 90° split beam.
Up and Down	Press to tilt the X-axis when it is in Manual Mode.
CW and CCW	Press to rotate the stationary and scanning beam in a clockwise or counterclockwise motion.
Scan 90° and Scan Memory	Press to quickly move the scanning or stationary beam at 90° intervals. In Scan Mode the scan width will automatically change to the smallest scan width when this function is activated. ☞ Scan Memory means that you can switch to rotational or stationary mode and the scan will return to the previous position when scanning motion is chosen again.
Head Speed	Press to change the speed of the head rotation.
Automatic/ Manual Mode	Press to change desired axis to Manual Mode.
Beam down	Press to stop the rotating head (zero rps). The position of the beam will move to the downward position to allow the user to align the Rugby over a reference point on the floor.
Sleep mode	Press to put the Rugby in sleep mode. • During Sleep Mode all functions are disabled. • The Low battery indicator flashes once every ten seconds to indicate the Rugby is in Sleep Mode. • The Rugby will sleep for two hours, then shuts down automatically and must be turned on again at the laser. • When in Sleep Mode pressing the sleep button will wake the Rugby and normal operation resumes.

Sending LED:

The sending LED flashes to indicate that the remote is sending a signal to the Rugby.

☞ The remote control is powered by a 2x AA batteries. replacement is the same as for the Rod Eye receivers.

Applications

- For layout work use the Beam down feature to position the beam over a reference point. Then use the Scan 90° feature to quickly move the small scan to a position to the left or right of the laser.
- For ceiling applications and marking elevations the Scan 90° feature can quickly bring the scanning beam to you.

2.5.1 Pairing the Rugby 840 with the RC400 Remote Control

Pairing step-by-step

The Rugby 840 and the RC400 Remote Control include radio devices that allow the user to activate additional functions on the Rugby.
When purchased together, the Rugby 840 and the RC400 have been paired together at the factory. Should it be necessary to pair your units after purchase, the following information is applicable.
Before using the RF features, the Rugby and the Remote Control must first be paired together to be able to communicate with each other.

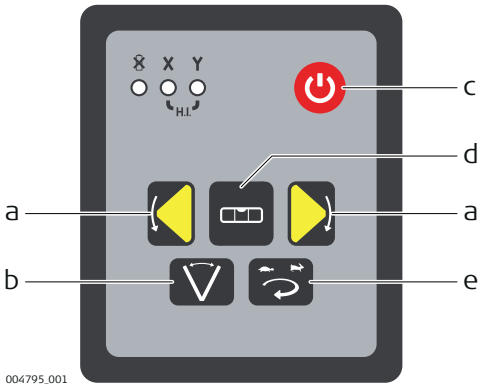
Step	Description
1.	Turn off the Rugby 840.
2.	Press and hold the Power button on the Rugby 840 for 5 seconds to turn on the Rugby 840 in pairing mode. The Rugby 840 beeps five times.
3.	Press and hold the Head Speed button and the Scan Mode button on the RC400.
☞	The X-axis Indicator LED and the Y-axis Indicator LED flash green and the Rugby 840 beeps five times quickly when the pairing was successful. The X-axis Indicator LED and the Y-axis Indicator LED flash red five times quickly if the pairing was not successful.

☞ Refer to "4.3 Pairing the Rod Eye 180 with the Rugby 840" for information on pairing the Rugby with the receiver.

3 Operation

3.1 Buttons

Buttons



a) Left and Right Arrow buttons
b) Scanning button
c) Power button
d) Automatic/Manual Mode button
e) Head speed button (rps)

Description of the Buttons

Button	Function
Left and Right Arrow	Press to enter a slope for an axis in Manual Mode.
Power	Press to turn on or off the Rugby.
Automatic/ Manual Mode	Press once to change the X-axis to Manual Mode with Y-axis self-levelling.
	Press again to change the Y-axis to Manual Mode with X-axis self-levelling.
	Press again to change both axes to Manual Mode with no self-levelling.
	Press again to change back to Full Automatic Mode. ☞ Note the changes in the LED indicators in the Manual Modes. The red LED indicates that the corresponding axis is in Manual Mode.
Scanning	Press to change the width of the scanning beam - 10° • 45° • 90°
Head Speed	Press to change the speed of the head rotation - 0 • 2 • 5 rps

3.2 LED Indicators

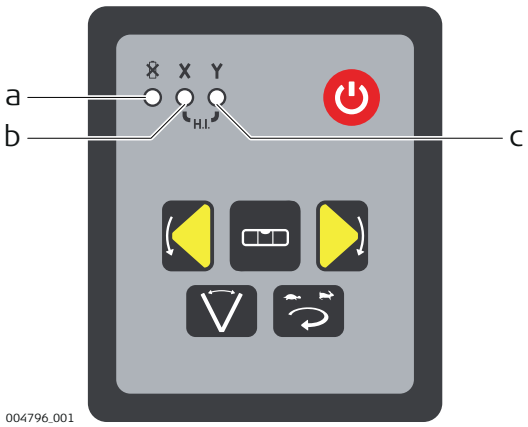
Main Functions

Description

The LED Indicators have three main functions:

- To indicate the level status of the axes.
- To indicate the battery status.
- To indicate an H.I. Alert condition.

Diagram of the LED Indicators



a) Low Battery Indicator LED
b) X-axis Indicator LED
c) Y-axis Indicator LED

Description of the LEDs

IF the	is/are	THEN
Low Battery Indicator LED (Li-Ion)	off	the battery is okay.
	flashing slowly	the battery has ≤ 10% (4 h) power remaining.
	flashing quickly	the battery has ≤ 5% (2 h) power remaining.
	red	the battery cannot power the Rugby. Charge the battery.
Low Battery Indicator LED (alkaline)	off	the battery is okay.
	flashing slowly	the battery is getting low.
	flashing rapidly	the battery needs to be changed.
X-axis and Y-axis Indicator LEDs	green	the axis is level.
	flashing green	the axis is levelling.
	red	the axis is in Manual Mode.
	both flashing red	an H.I. Alert is indicated.

3.3 Turning on and off the Rugby

Turning on and off

Press the Power button to turn on or off the Rugby.

After turning on:

- If set up within the +/-6° self-levelling range (horizontal or vertical), the Rugby automatically levels to create an accurate horizontal plane of laser light.
- Once levelled, the head starts rotating and Rugby is ready for use.
- After 30 seconds of completing the levelling, the H.I. Alert system becomes active to protect the laser against changes in elevation caused by movement or settling of the tripod.
- The self-levelling system and H.I. Alert function continues to monitor the position of the laser beam to ensure consistent and accurate work.

3.4 Automatic Mode

Description of the Automatic Mode

The Rugby always starts up in Automatic Mode.
In Automatic Mode the Rugby automatically levels if set up within the 6° self-levelling range (horizontal or vertical).

3.5 Manual Mode

Description of the Manual Mode

After start-up the Manual Mode can be activated. In Manual Mode the self-levelling will be deactivated. The following options are available:

- Change the X-axis to Manual Mode
- Change the Y-axis to Manual Mode
- Change to Full Manual Mode

☞ After turning the Rugby off and on again, the Rugby is in Automatic Mode.

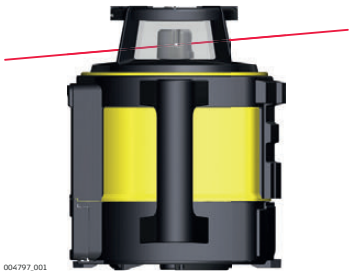
Changing the X-axis to Manual Mode

After startup, press the Automatic/Manual Mode Button once to change the X-axis to Manual Mode.

☞ The X-axis and Y-axis are marked on the top of the Rugby.

- The X-axis does not self-level and a slope can be entered in this axis using the Up and Down Arrow buttons on the Rugby.
- The X-axis LED is red.
- The Y-axis continues to self-level and the Y-axis LED flashes green until level.

When the X-axis is in Manual Mode, the X-axis can be sloped upwards or downwards as illustrated.



Changing the Y-axis to Manual Mode

Press the Automatic/Manual Mode button again to change the Y-axis to Manual Mode.

☞ The X-axis and Y-axis are marked on the top of the Rugby.

- The Y-axis does not self-level and a slope can be entered in this axis using the Up and Down Arrow buttons on the Rugby.
- The Y-axis LED is red.
- The X-axis continues to self-level and the X-axis LED flashes green until level.

When the Y-axis is in Manual Mode, the Y-axis can be sloped upwards or downwards as illustrated.

Changing to Full Manual Mode

Press the Automatic/Manual Mode button again to change to Full Manual Mode.

☞ The X and Y axes are marked on the top of the Rugby.

- Both the X-axis and Y-axis do not self-level and a slope can be entered in the Y-axis using the Left and Right Arrow buttons on the Rugby.
- The X-axis LED is red.
- The Y-axis LED is red.

When both the X-axis and Y-axis are in Manual Mode, the Y-axis can be sloped using the Left and Right Arrow buttons.

☞ When using the RC400 Remote Control, each of the axes can be sloped independently.

3.6 Elevation Alert (H.I.) Function

Description of the Elevation Alert function

- The Elevation Alert or Height of Instrument (H.I.) function prevents incorrect work caused by movement or settling of the tripod that would cause the laser to level at a lower height.
- The Elevation Alert function becomes active and monitors the movement of the laser 30 second after the Rugby has completely levelled and the head of the laser starts rotating.
- The Elevation Alert monitors the laser. If disturbed, both the X-axis LED and Y-axis LED flash and the Rugby beeps rapidly.
- To stop the alert turn Rugby off and on again. Check the height of the laser before beginning to work again.

☞ The Elevation Alert function turns on automatically every time the Rugby is turned on.

Disable or enable the Elevation Alert function

The Elevation Alert function can be disabled or enabled by pressing the following button combination:

- With the Rugby turned on, press and hold the Left and Right Arrow buttons.
- Press the Automatic/Manual Mode button.

☞ The Rugby beeps once to indicate the change.

4 Receiver

Description

The Rugby 840 is sold with the Rod Eye 180 Digital RF Receiver. Using the Rugby 840 together with the Rod Eye 180 enables the user to perform special functions such as automatic slope catching and monitoring, as well alignment of the vertical plane for batter boards and facade applications.
Additional information on the Rod Eye 180 Digital RF Receiver can be found in the individual user manuals also located on this CD.

4.1 Rod Eye 180, Digital RF Receiver (used with the Rugby 840)

Instrument components

a) Speaker
b) LCD Digital Display
c) LED Display
d) Power button
e) Laser man button
f) Reception window
g) Bandwidth button
h) Audio button
i) X and Y buttons

Description of the Buttons

Button	Function
Power	Press once to turn on the receiver.
	Press 1.5 seconds to turn off the receiver.
Laser man	Press to capture the digital reading.
	Press 1.5 seconds to start the Smart Target functions such as automatic slope catching on the X-axis in the upright mode and automatic vertical plane alignment in the laying down mode.
Bandwidth	Press to change detection bandwidths.
Audio	Press to change the audio output.
X and Y	Press to select alternate or second axis for slope catching and slope monitoring.

4.2 Menu

Menu access and navigation

To access the menu of the Rod Eye 180 Digital RF Receiver, press the Bandwidth button and Audio button simultaneously.

- Use the Bandwidth button and Audio button to change parameters.
- Use the Power button to scroll through the menu.

Menu

Menu	Function	Indication
UNT	Changes the unit of measure for the digital readout.	Units - mm/cm/in/ft ☞ Active unit flashes.
LED	Changes the brightness of the LED indicators.	LEDs - High/Low/Off
DRO	Turns on or off the digital readout.	Green LED is on: digital readout is on.
		Red LED is on: digital readout is off.
		☞ DRO flashes.
BAT	Turns on or off the Laser low battery indication on the receiver.	Green LED is on: Laser low battery icon function is active.
		Red LED is on: Laser low battery icon function is not active.
		☞ Rugby icon flashes.
MEM	Turns on or off the position memory function.	Green LED is on: function is on.
		Red LED is on: function is off.
		☞ Full down arrow flashes.
RPS	Measures the head speed of the laser. ☞ Hold in rotating beam to measure the head speed.	Measured head speed is displayed.

4.3 Pairing the Rod Eye 180 with the Rugby 840

Pairing step-by-step

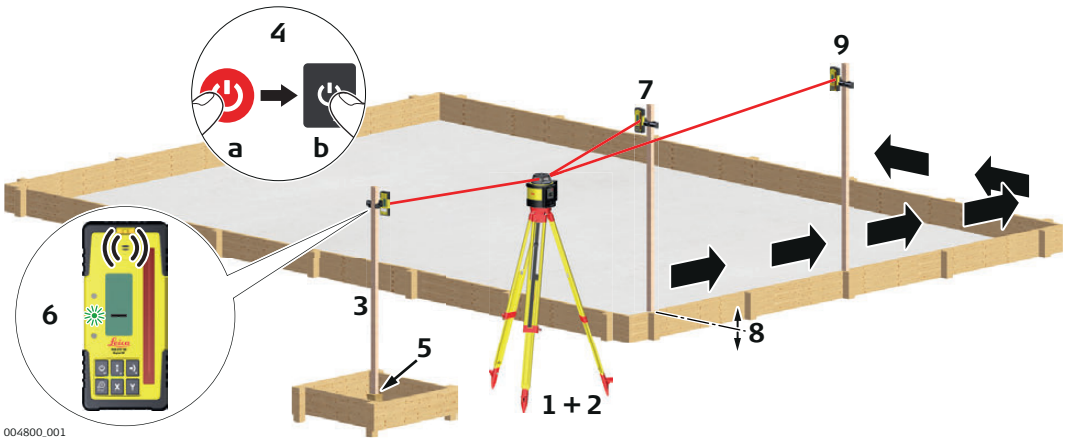
The Rugby 840 and the Rod Eye 180 include radio devices that allow the user to automatically match an existing grade.
When purchased together, the Rugby 840 and Rod Eye 180 have been paired together at the factory. If purchasing a second receiver, the Rugby 840 and the Rod Eye 180 must first be paired together to be able to communicate with each other.

Step	Description
1.	Turn off the Rugby 840 and the Rod Eye 180.
2.	Press and hold the Power button on the Rugby 840 for 5 seconds to turn on the Rugby 840 in pairing mode. The Rugby 840 beeps five times.
3.	Press and hold the Power button on the Rod Eye 180 for 5 seconds.
☞	The X-axis Indicator LED and the Y-axis Indicator LED flash green and the Rugby 840 beeps five times quickly when the pairing was successful. The X-axis Indicator LED and the Y-axis Indicator LED flash red five times quickly if the pairing was not successful.

5 Applications

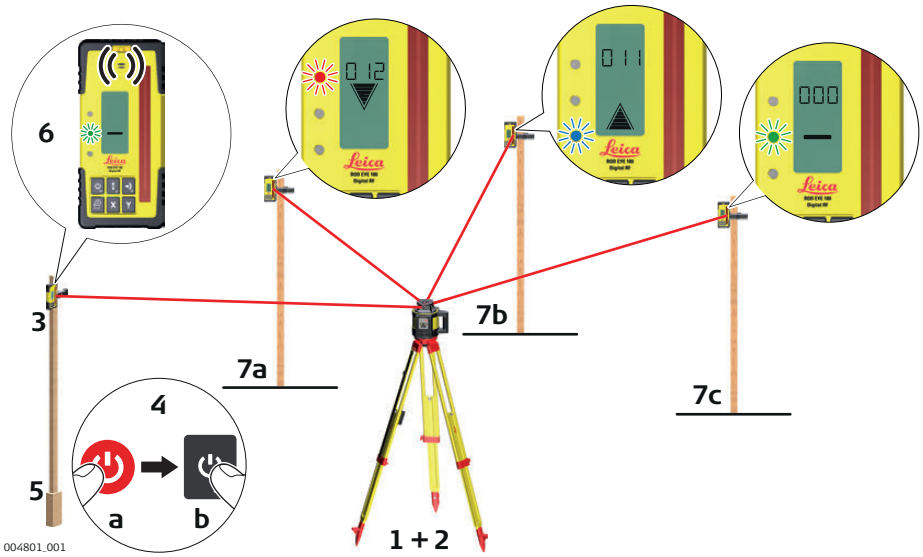
5.1 Setting Forms

Setting Forms step-by-step



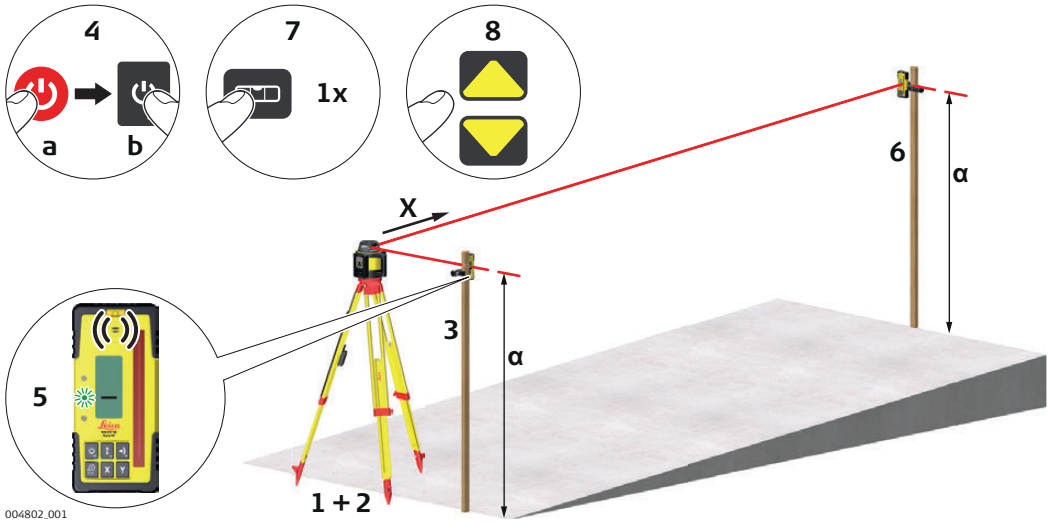
Step	Description
1.	Set up the Rugby on a tripod.
2.	Set up the tripod on a stable surface outside the working area.
3.	Attach the receiver to a rod.
4.	Turn on the Rugby and the receiver.
5.	Set the base of the rod on a known point for the finished height of forms.
6.	Adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar • the green flashing LED • a solid audio tone • the digital display
7.	Set the rod with the attached receiver on top of the form.
8.	Adjust the height of the form until the on-grade position is again indicated.
9.	Continue to additional positions until the forms are levelled to the rotating plane of the Rugby.

Checking Grades step-by-step



Step	Description
1.	Set up the Rugby on a tripod.
2.	Set up the tripod on a stable surface outside the working area.
3.	Attach the receiver to a rod.
4.	Turn on the Rugby and the receiver.
5.	Set the base of the rod on a known point for the finished grade.
6.	Adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar • the green flashing LED • a solid audio tone • the digital display
7.	Set the rod with the attached receiver on top of the excavation or concrete pour to check for correct elevation.
8.	Variances can be read in precise measurements with the digital receiver. • 7a: Position is too high. • 7b: Position is too low. • 7c: Position is on grade.

Manual Grading step-by-step



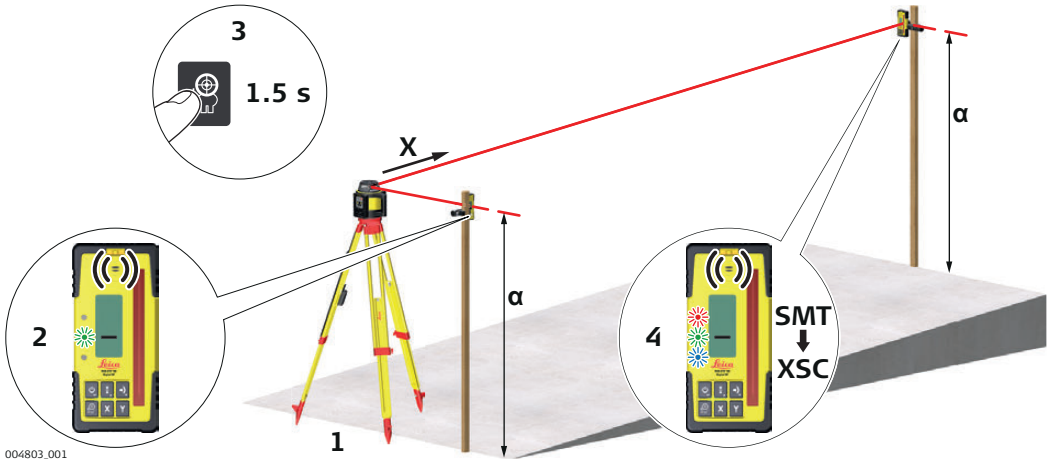
Step	Description
1.	Set up the Rugby on a tripod.
2.	Set up the tripod at the base of a slope with the x-axis pointing in the direction of the slope.
3.	Attach the receiver to a rod.
4.	Turn on the Rugby and the receiver.
5.	At the base of the slope, adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar • the green flashing LED • a solid audio tone • the digital display
6.	Move the rod and the attached receiver to the top of the slope.
7.	Change the X-axis to Manual Mode by pressing the Automatic/Manual Mode button once on the Rugby.
8.	Use the Up and Down Arrow buttons on the Rugby to move the laser beam up and down until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar • the green flashing LED • a solid audio tone • the digital display

Description

The Rugby 840 and the Rod Eye 180, Digital Receiver RF, contain radio devices which allow for special features when used together.

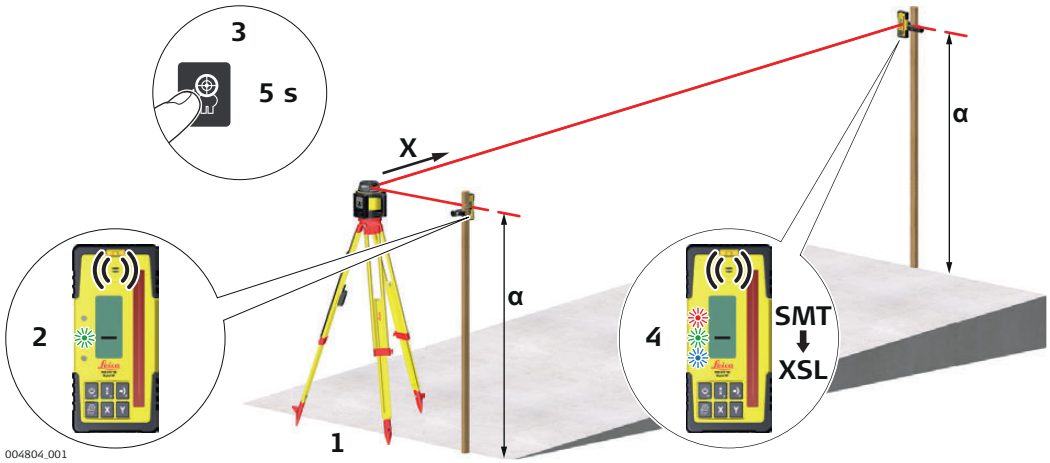
5.4.1 Smart Target (Automatic Slope Catching)

Smart Targeting using the Rugby 840, step-by-step



Step	Description
1.	Set up the Rugby 840 at the base of a slope with the X-axis pointing in the direction of the slope.
2.	At the base of the slope, adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar • the green flashing LED • a solid audio tone • the digital display
3.	Move to the top of the slope and press the laser man button for 1.5 seconds to start the smart targeting process. The receiver shows **SMT**, then **XSC** for X-axis slope catching.
4.	The Rugby 840 searches for the receiver until the on-grade position is found. Once the on-grade position, the receiver will flash all three LEDs simultaneously one time and the receiver returns to normal operation.
5.	After this signal the receiver can be moved and used as normal. The sloped axis is in Manual mode and should be checked from time to time to ensure the Rugby 840 has not moved.

Smart Target Lock using the Rugby 840, step-by-step



Step	Description
1.	Set up the Rugby 840 at the base of a slope with the X-axis pointing in the direction of the slope.
2.	At the base of the slope, adjust the height of the Rod Eye 180 Digital Receiver RF on the rod until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar • the green flashing LED • a solid audio tone • the digital display
3.	Move to the top of the slope and press the laser man button for 5 seconds to start the smart target and lock process. The receiver will show **SMT**, then **XSL** during the X-axis slope lock process.
4.	The Rugby 840 searches for the receiver until the on-grade position is found. Once the on-grade position is found, the receiver will flash all three LEDs simultaneously one time and the receiver returns to normal operation. The display will show **LOC** while the receiver is in lock mode. ☞ To turn off lock mode on the receiver, hold the power button for 1.5 seconds.

Dual Receiver setups using the Rugby 840

It is possible to use the Smart Targeting feature of the Rod Eye 180 Digital RF Receiver to catch and monitor both axes of the laser. To do this, perform the actions above for the first axis, and then repeat the actions for the second axis using a second receiver.

☞ To use the Smart Target feature to slope catch and monitor both axes, it is necessary to have two receivers.

☞ Once the lock and monitoring process is started, the receivers must remain in place.

Individual axis can be selected for the Smart Targeting procedure by first pressing the X or Y button on the receiver keypad and the laser man button.

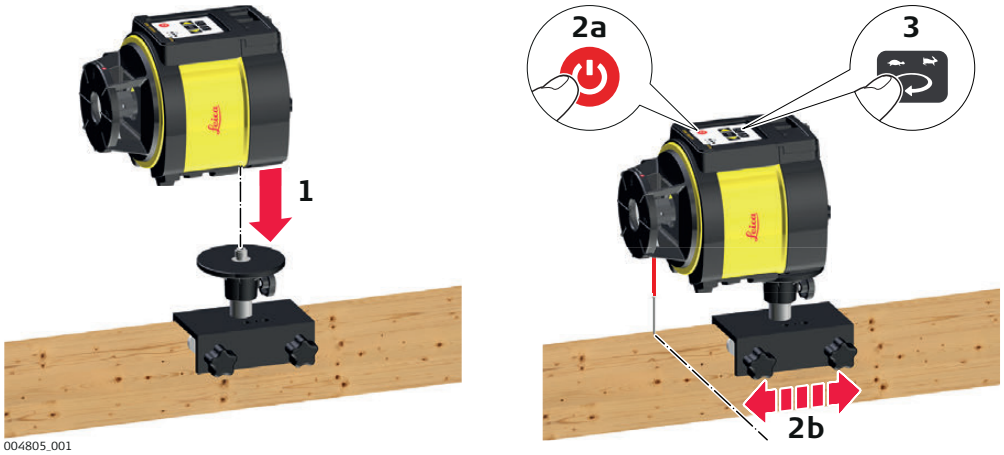
Action	Buttons
To slope catch the X-axis: Press **X** plus Laser Man for 1.5 seconds	1x X + 1.5 s
To slope catch and lock the X-axis: Press **X** plus Laser Man for 5 seconds.	1x X + 5 s
To slope catch the Y axis: Press **Y** plus Laser Man for 1.5 seconds.	1x Y + 1.5 s
To slope catch and lock the Y-axis: Press **Y** plus Laser Man for 5 seconds.	1x Y + 5 s

Description

The Rugby 840 and the Rod Eye 180 Digital Receiver create a vertical plane of laser light that acts as a virtual string line for batter board setups.

Setup

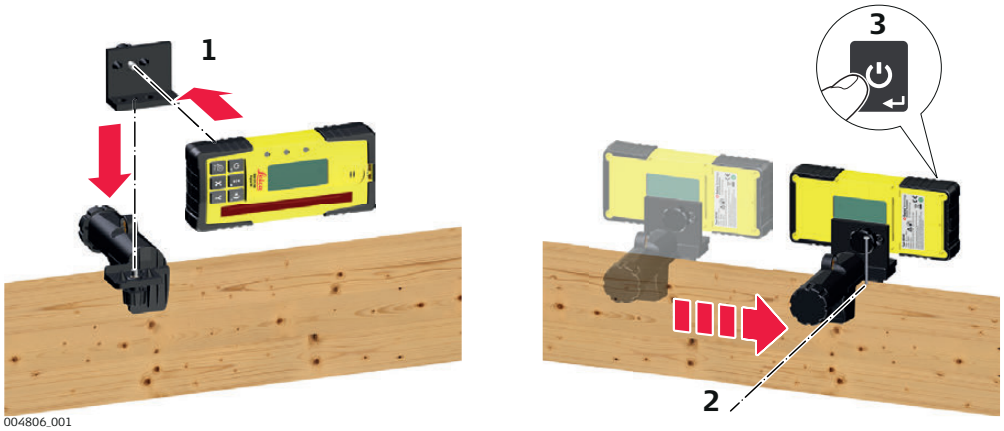
Laser setup



004805_001

Step	Description
1.	Mount the Rugby to the clamp and then the clamp to the batter board.
2.	Turn on the Rugby. The laser beam will automatically point downwards so that the laser and the clamp can be positioned directly over the surveyed reference nail.
3.	Set the head rotation to the fastest speed (10 rps).

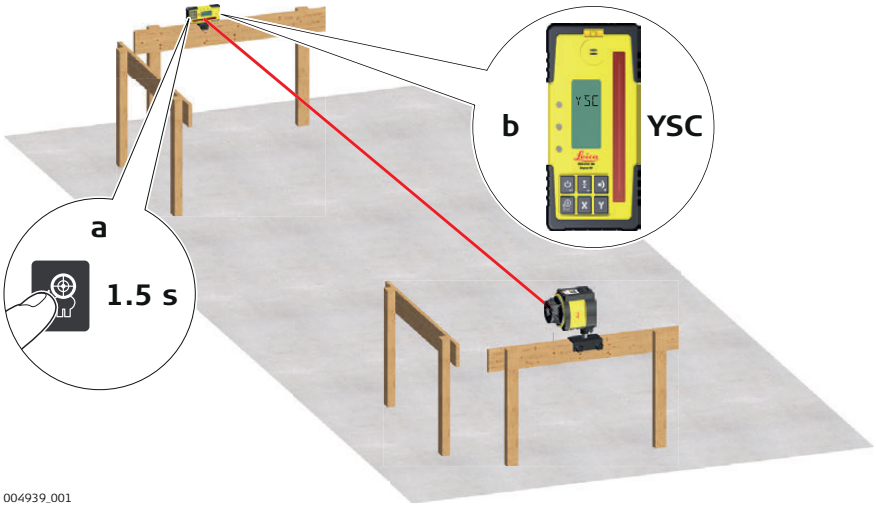
Receiver setup



004806_001

Step	Description
1.	Mount the receiver to the receiver bracket using the 90° adapter.
2.	Attach the bracket to the batter board. The top of the receiver bracket should be tight against the surveyed reference nail.
3.	Turn on the receiver.

Alignment

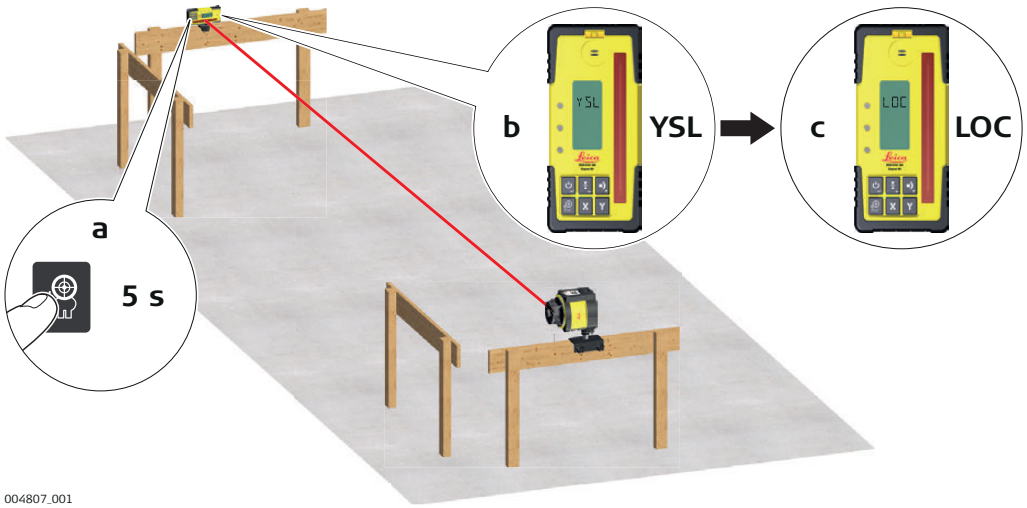


- Use the remote control to move the rotating laser beam left or right until the receiver displays an on-grade position.

OR

- Use the Smart Target function of the receiver to automatically align the vertical rotating plane to the receiver. Press the Laser man button on the receiver for 1.5 seconds to start the alignment process. The receiver will display **YSC**.

Monitoring



Use the Smart Target function of the receiver to automatically align and then monitor the laser beam. Press the Laser Man button on the receiver for 5 seconds to start the alignment and slope catching and lock/monitoring process. The receiver will display **YSL**, then **LOC** when the process is complete.

Description

The Rugby 840 and the Rod Eye 180 Digital Receiver create a vertical plane of laser light that is aligned to the building and acts as a constant reference for facade installations.

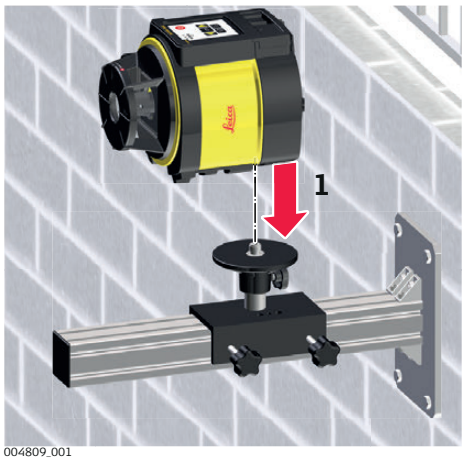
Setup

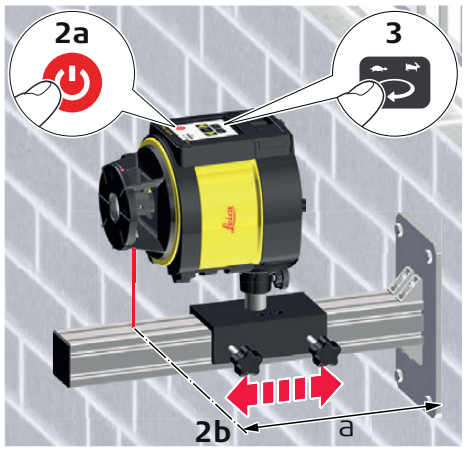
Mounting the facade adapter brackets

004808_002

Step	Description
1.	Mount the facade adapter brackets to the side of the building in locations where it is desired to have a laser and receiver setup.

Laser setup

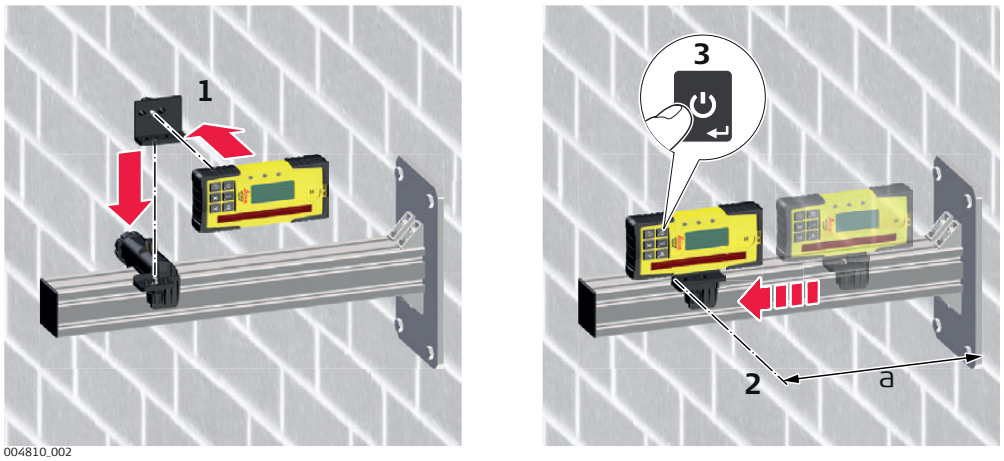




004809_001

Step	Description
1.	Mount the Rugby to the clamp and then the clamp to the facade adapter bracket.
2.	Turn on the Rugby. The laser beam will automatically point downwards so that the laser and the clamp can be positioned at the desired distance from the building's surface.
3.	Set the head rotation to the fastest speed (10 rps).

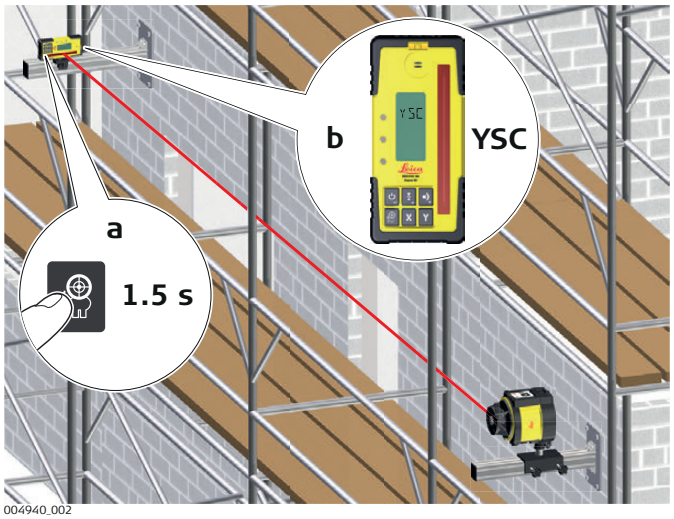
Receiver setup



004810_002

Step	Description
1.	Mount the receiver to the receiver bracket using the 90° adapter.
2.	Attach the bracket to the facade adapter bracket. The top of the receiver bracket should be set at the same distance from the building's surface as the laser for proper alignment.
3.	Turn on the receiver.

Alignment



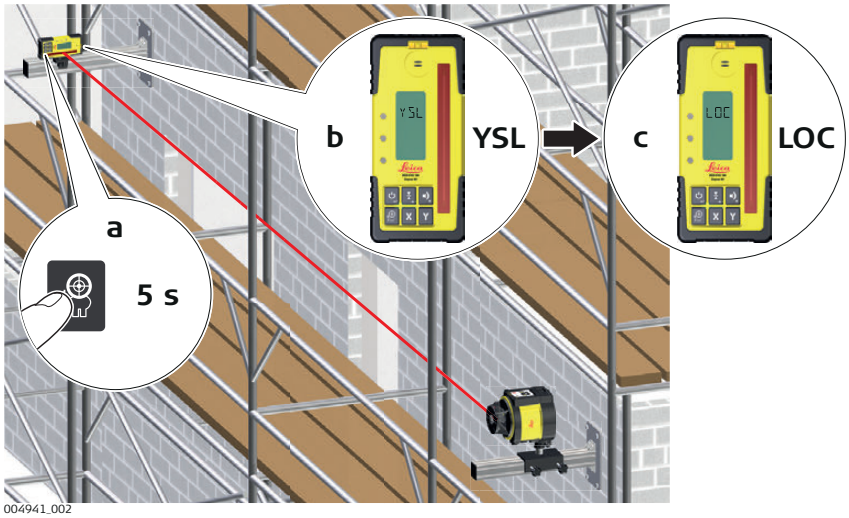
004940_002

- Use the remote control to move the rotating laser beam left or right until the receiver displays an on-grade position.

OR

- Use the Smart Target function of the receiver to automatically align the vertical rotating plane to the receiver. Press the Laser man button on the receiver for 1.5 seconds to start the alignment process. The receiver will display **XSC**.

Monitoring



004941_002

Use the Smart Target function of the receiver to automatically align and then monitor the laser beam. Press the Laser Man button on the receiver for 5 seconds to start the alignment and slope catching and lock/monitoring process. The receiver will display **YSL**, then **LOC** when the process is complete.

5.4.6 Suspended Ceilings

Description

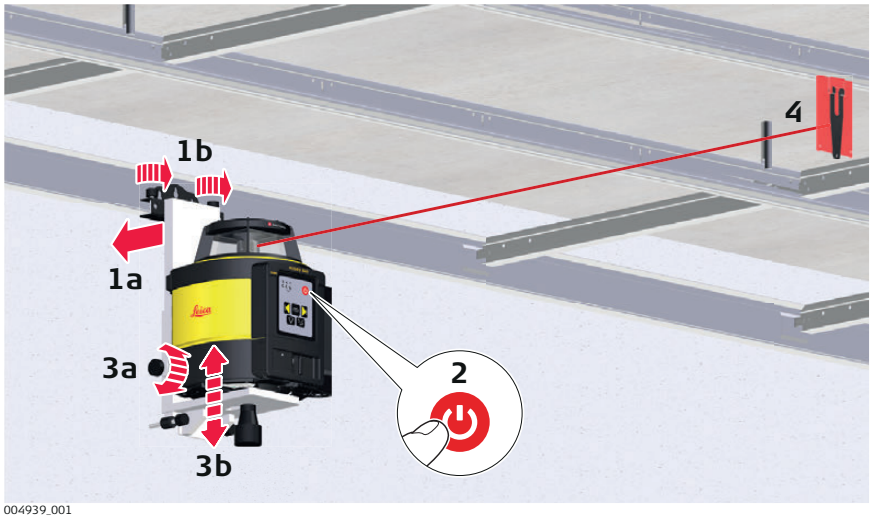
The Rugby 840 can also be used for suspended ceiling installations.

Mounting the laser

004811_001

Step	Description
1.	Attach the Rugby to the wall mount bracket.

Application

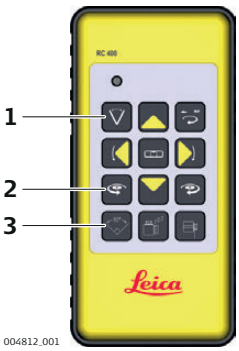


004939_001

Step	Description
1.	After mounting the first strip of ceiling trim at the desired height (centre position of the ceiling target) below, attach the wall mount bracket and laser to the trim. Tighten the locking knobs on the top of the bracket.
2.	Press the Power button to turn on the Rugby and allow the Rugby to self-level.
3.	Adjust the Rugby so that the rotating beam is at the desired height below the ceiling grid. Loosen the adjustment knob on the side of the bracket and slide the Rugby up or down. When at the desired height, retighten the adjustment knob.
4.	Install the ceiling grid using the ceiling grid target and laser beam as your reference.

Setup

When installing suspended ceilings use the remote control to change to scanning mode for increased visibility (1).
The scanning beam can be rotated using the clockwise and counter clockwise buttons on the remote (2).
The scanning beam can be moved quickly in 90° increments using the Scan 90° button (3).



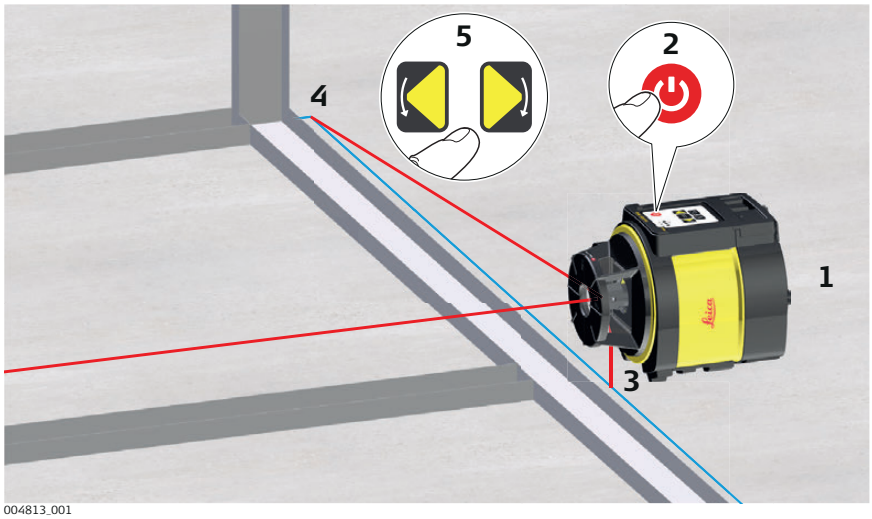
004812_001

Description

In the laying down position the Rugby 840 can be used for laying out wall positions, squaring, transferring points and more.

Layout

The Rugby 840 projects two laser beams at a 90° angle to each other.

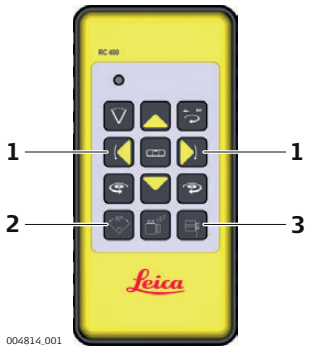


004813_001

Step	Description
1.	Place the Rugby in the laydown position.
2.	Press the power button to turn on the Rugby. The Rugby will always turn on in Automatic Mode. Allow the Rugby to self-level.
3.	In the laying down position the Rugby will move the beam to downwards for alignment over your reference.
4.	Start the head rotation or scanning motion to roughly align the beam to a second control point.
5.	Using the buttons on the laser or the remote control, fine adjust the beam until striking the second control point.
6.	Once aligned the split beam and rotating beams can be used to locate 90° angles for layout. The rotating beam also creates a vertical plane for transferring points from the floor to the ceiling.

Setup

When using the Rugby in the laydown position use the left or right arrow buttons on your remote control to quickly align the vertical plane or plumb beam to the second reference point. (1).
The scanning beam can be moved quickly to the left or right side of the laser using the Scan 90° button (2).
To check the alignment over a point press the Beam down button (3).



004814_001

More applications

Exterior Applications

- Setting elevation of forms and footings
- Squaring of forms
- Checking elevations and benchmarks
- Landscaping
- Drainage and septic systems
- Fences and retaining walls
- Decks and patios
- Simple driveways or small parking lots
- Facade Installations
- Batter board setups

Interior Applications

- Suspended ceilings
- Walls and partitions
- Vertical alignment
- Transferring points from floor to ceiling
- Vertical plumb
- Layout of floors
- Squaring of angles
- Setting cabinets
- Chair rails and wainscoting
- Alignment of wall and floor tiles
- Trim carpentry
- Setting sprinkler head heights
- Sloped ceilings

6 Batteries

Description

The Rugby 840 can be purchased with alkaline batteries or a rechargeable Li-Ion battery pack.
The following information is appropriate only to the model you have purchased.

6.1 Operating Principles

Charging / first-time use

- The battery must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.
- The permissible temperature range for charging is between 0°C to +40°C/ +32°F to +104°F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery if the temperature is too high.
- For new batteries or batteries that have been stored for a long time (> three months), it is effectual to make only one charge/discharge cycle.
- For Li-Ion batteries, a single discharging and charging cycle is sufficient. We recommend carrying out the process when the battery capacity indicated on the charger or on a Leica Geosystems product deviates significantly from the actual battery capacity available.

Operation / Discharging

- The batteries can be operated from -20°C to +55°C/-4°F to +131°F.
- Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery.

6.2 Battery for Rugby

Charging the Li-Ion battery pack step-by-step

The rechargeable Li-Ion battery pack on the Rugby can be charged without removing the battery pack from the laser.

Step	Description
1.	Slide the locking mechanism on the battery compartment to the very left to expose the charge jack.
2.	Plug the AC connector into the appropriate AC power source.
3.	Connect the charger plug into the charge jack on the Rugby battery pack.
4.	The small LED next to the charge jack flashes indicating that the Rugby is charging. The LED is on solid when the battery pack is fully charged.

Step	Description
5.	When the battery pack is fully charged, disconnect the charger plug from the charge jack.
6.	Slide the locking mechanism to the centre position to prevent dirt from getting into the charging jack.

☞ The battery pack reaches a full charge in approximately 5 hours if completely empty. A one hour charge should allow the Rugby to run for a full eight hours.

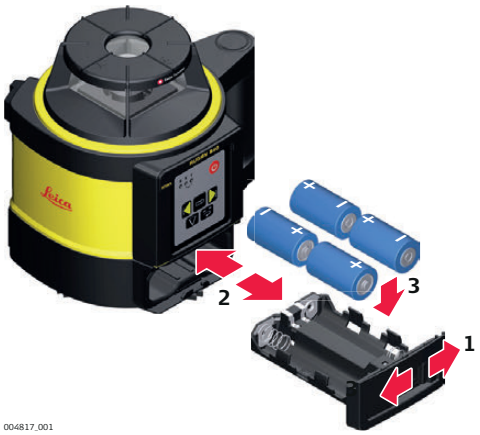
Changing the Li-Ion batteries step-by-step

The Low Battery Indicator LED on the Rugby flashes when the batteries are low and need to be charged.
The charge indicator LED on the Lithium-Ion battery pack indicates when the pack is being charged (flashing slowly) or fully charged (on, not flashing).

Step	Description
☞	The batteries are inserted in the front of the laser.
☞	The rechargeable battery pack can be recharged without being removed from the laser. Refer to " Charging the Li-Ion battery pack step-by-step" for further information.
1.	Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.
2.	To remove the batteries: Remove the batteries from the battery compartment.
	To insert the batteries: Insert the batteries into the battery compartment.
3.	Close the cover of the battery compartment and slide the locking mechanism to the left centre position until it locks into position.

Changing the alkaline batteries step-by-step

The Low Battery Indicator LED on the Rugby flashes when the batteries are low and need to replaced.



Step	Description
☞	The batteries are inserted in the front of the laser.
1.	Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.
2.	To remove the batteries: Remove the batteries from the battery compartment.
	To insert the batteries: Insert the batteries into the battery compartment, ensuring that the contacts are facing in the right direction. ☞ The correct polarity is displayed on the battery holder.
3.	Close the cover of the battery compartment and slide the locking mechanism to the left until it locks into position.

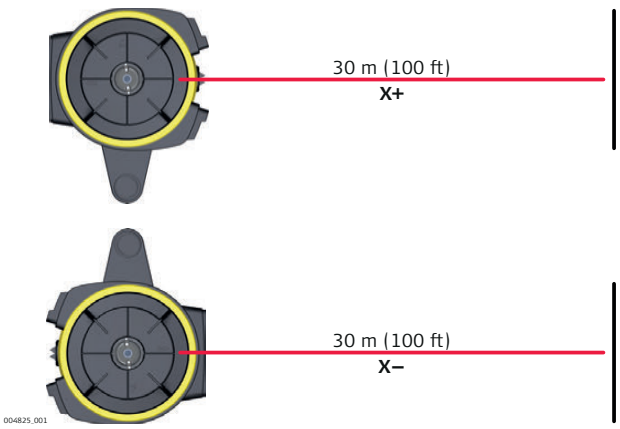
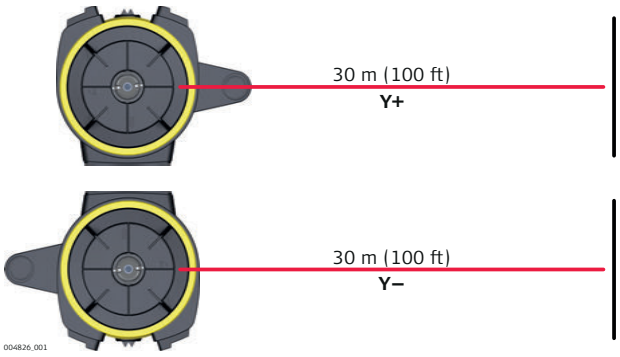
7 Accuracy Adjustment

About

- It is the responsibility of the user to follow operating instructions and to periodically check the accuracy of the laser and work as it progresses.
- The Rugby is adjusted to the defined accuracy specification at the factory. It is recommended to check the laser for accuracy upon receipt and periodically thereafter to ensure accuracy is maintained. If the laser requires adjustment, contact your nearest authorised service centre or adjust the laser using the procedures described in this chapter.
- Only enter the accuracy adjustment mode when you plan to change the accuracy. Accuracy adjustments should only be performed by a qualified individual that understands basic adjustment principles.
- It is recommended to perform this procedure with two people on a relatively flat surface.

7.1 Checking the Level Accuracy

Checking the level accuracy step-by-step

Step	Description
1.	Place the Rugby on a flat, level surface or tripod approximately 30 m (100 ft) from a wall.
	
2.	Align the first axis so that it is square to a wall. Allow the Rugby to self-level completely (approximately 1 minute after the Rugby begins to rotate).
3.	Mark the position of the beam.
4.	Rotate the laser 180° and allow it to self-level.
5.	Mark the opposite side of the first axis.
	
6.	Align the second axis of the Rugby by rotating it 90° so that this axis is square to the wall. Allow the Rugby to self-level completely.
7.	Mark the position of the beam.

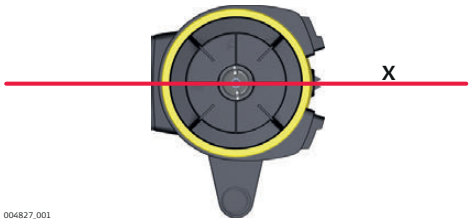
Step	Description
8.	Rotate the laser 180° and allow it to self-level.
9.	Mark the opposite side of the second axis.

☞ The Rugby is within its accuracy specification if the four marks are within ± 1.5 mm (± 1/16") from the centre.

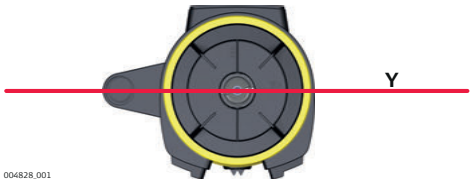
7.2 Adjusting the Level Accuracy

Description

In Adjustment Mode the X-axis LED indicates changes to the X-axis.



The Y-axis LED indicates changes to the Y-axis.



Entering adjustment mode step-by-step

Step	Description
1.	Turn off the power.
2.	Press and hold both the Left and Right Arrow buttons.
3.	Press the Power button. The active axis is the X-axis.

The following sequence of LED behaviour occurs:

- The X-axis and the Y-axis LEDs flash alternately three times.
- The X-axis LED flashes three times, then flashes slowly until level. When the Rugby is level, the X-axis LED is on, but does not flash.
- The Y-axis LED is off.

Adjusting the X-axis step-by-step

Step	Description
1.	Press the Left and Right Arrow buttons to increment the laser beam up and down. Each increment is indicated by a flash of the X-axis LED and a beep from the audio indicator.
2.	Continue to press the Left and Right Arrow buttons and monitor the spot until the Rugby is within its specified range. ☞ Five steps are equal to 10 arc seconds of change, or approximately 1.5 mm at 30 m (1/16" at 100').
3.	Press the Automatic/Manual Mode button to switch to the Y-axis.

The following sequence of LED behaviour occurs:

- The X-axis and the Y-axis LEDs flash alternately three times.
- The Y-axis LED flashes three times, then flashes slowly until level. When the Rugby is level, the Y-axis LED is on, but does not flash.
- The X-axis LED is off.

Adjusting the Y-axis step-by-step

Step	Description
1.	Press the Left and Right Arrow buttons to increment the laser beam up and down. Each increment is indicated by a flash of the Y-axis LED and a beep from the audio indicator.
2.	Continue to press the Left and Right Arrow buttons and monitor the spot until the Rugby is within its specified range. ☞ Five steps are equal to 10 arc seconds of change, or approximately 1.5 mm at 30 m (1/16" at 100').
3.	Press the Automatic/Manual Mode button to switch back to the X-axis if desired.

Entering adjustment mode for the Z-axis step-by-step

Step	Description
1.	Turn off the power.
2.	Place the Rugby in the laydown position.
3.	With Power off, press and hold both the Left and Right Arrow buttons.
4.	Press the Power button. The active axis is the Z-axis.

The following sequence of LED behaviour occurs:

- The X-axis and the Y-axis LEDs flash alternately three times.
- The X-axis LED flashes three times, then flashes slowly until level. When the Rugby is level, the X-axis LED is on, but does not flash.
- The Y-axis LED is off.

Adjusting the Z-axis (vertical plane) step-by-step

Step	Description
1.	Press the Left and Right Arrow buttons to increment the laser beam's vertical position. Each increment is indicated by a flash of the X-axis LED and a beep from the audio indicator.
2.	Continue to press the Left and Right Arrow buttons and monitor the spot until the Rugby is within its specified range.

Exiting adjustment mode step-by-step

Press and hold the Automatic/Manual Mode button for 3 seconds to save and exit Adjustment Mode.
The X-axis LED and Y-axis LED flash alternately three times, then the Rugby shuts off.

☞ Pressing the Power button at any time while in Adjustment Mode will exit the mode without saving changes.

8 Automatic Field Calibration

About

This procedure is unique to the Rugby lasers and uses the digital readout of the Rod Eye 180 receiver to measure, then adjust the plane of each axis. This procedure is an alternative to the traditional method described in "7 Accuracy Adjustment".

☞ The automatic field calibration procedure cannot be used to adjust the vertical plane in the laying down position.

Description

Objective: To rotate the laser to all four axes, then allow the receiver to adjust the beam automatically.

Setup

Step	Description
1.	Pair the receiver to the laser (if not already done). Refer to "4.3 Pairing the Rod Eye 180 with the Rugby 840" for more information.
2.	Mount the laser on a flat, level surface or tripod.
3.	Turn on the laser and align the X-axis toward the receiver position.
4.	Mount the receiver to a fixed position (e.g., a stationary grade rod) approximately 30 meters (100 ft) from the laser.
5.	Turn on the receiver and position the height of the receiver near or at the on-grade position. It is not necessary to be exact.
6.	Turn off the receiver.
7.	Turn on the receiver in **CAL** mode by pressing both the power and Laser man button for five seconds.
8.	The display will show **CAL**.
9.	Return to the laser and note the colour and activity of the X and Y LEDs.

☞

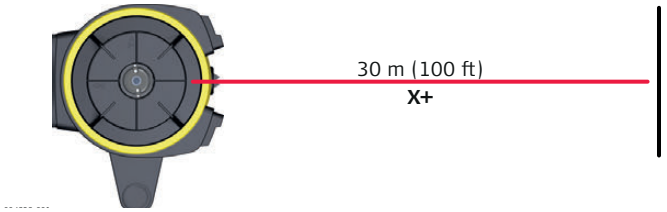
- With each rotation it may take up to 10 seconds for the calibration process to identify the axis being checked, i.e. before the LED starts to blink red.
- Each step of the process is very exact and may take 1 minute to complete before the LED turns to green.
- It is important to note the colour and blink sequence to know the status of each axis in the process.
- It is not necessary to follow the steps in the exact order, but different rotation sequences will result in different LED indications.
- Increasing the distance beyond 30 meters (100 ft) between the laser and receiver will not increase the accuracy of the calibration process.

Calibrating step-by-step

The following table defines and displays the LED indications that will be seen during each step of the field calibration process.

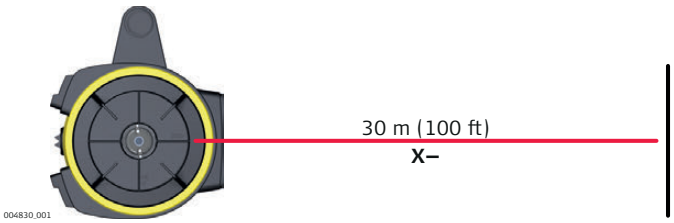
X-axis LED	Y-axis LED	X	Y	X-axis status	Y-axis status	Actions
Red on	Red on			X-axis not aligned	Y-axis not aligned	Rotate laser until the X-axis LED is flashing red.

Step 1 - Rotate and align the first side of the X-axis (X+)



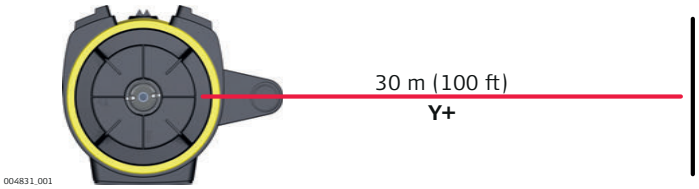
X-axis LED	Y-axis LED	X	Y	X-axis status	Y-axis status	Actions
Flashing red	Off			X-axis is levelling	Off	Wait until the first side of the X-axis is measured.
Flashing green	Red on			X-axis is half complete	Y-axis not aligned	Rotate laser 180° until the X-axis LED is again flashing red.

Step 2 - Rotate 180° and align to the opposite side of the X-axis (X-)



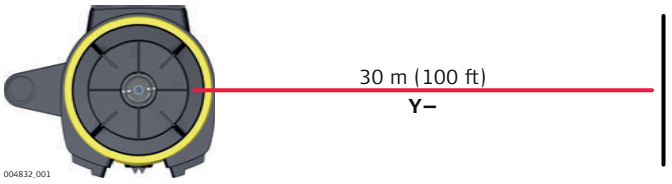
X-axis LED	Y-axis LED	X	Y	X-axis status	Y-axis status	Actions
Flashing red	Off			X-axis is levelling	Off	Wait until the reverse of the X-axis is measured.
Green on	Red on			X-axis is complete	Y-axis not aligned	Rotate laser 90° until the Y-axis LED is flashing red.

Step 3 - Rotate 90° and align to the first side of the Y-axis (Y+)



X-axis LED	Y-axis LED	X	Y	X-axis status	Y-axis status	Actions
Off	Flashing red	○	✳	Off	Y-axis is levelling	Wait until the first side of the Y-axis is measured.
Green on	Flashing green	●	✳	X-axis is complete	Y-axis is half complete	Rotate laser 180° until the X-axis LED is again flashing red.

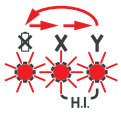
Step 4 - Rotate 180° and align to the opposite side of the Y-axis (Y-)



X-axis LED	Y-axis LED	X	Y	X-axis status	Y-axis status	Actions
Off	Flashing red	○	✳	Off	Y-axis is levelling	Wait until the reverse of the Y-axis is measured.
Green on	Green on	●	●	X-axis is complete	Y-axis is complete	Done.

If the calibration process was successful, the X and Y LEDs will flash alternately three times, the beeper will sound and the Rugby will then turn off.
If the Rugby does not complete the procedure as noted above, the procedure has failed and must be repeated.

Alerts

Alert	Symptom	Possible causes and solutions
	Low Battery LED flashes red, or is on but not flashing.	The batteries are low. Replace the alkaline batteries or recharge the Li-Ion battery pack. Refer to "6 Batteries".
	Elevation (H.I.) Alert The LEDs flash quickly with an audio beep.	The Rugby has been bumped or tripod was moved. Turn off Rugby to stop alert check the height of the laser before beginning to work again. Allow Rugby to re-level and check the height of the laser. After two minutes in the alert condition, the unit will shut off automatically.
	Servo Limit Alert All LEDs flash sequentially.	The Rugby is tipped too far to reach a level position. Re-level the Rugby within the 6 degree self-levelling range. This alert will also be displayed any time the unit is tipped more than 45° from level. After two minutes in the alert condition, the unit will shut off automatically.
	Temperature Alert All LEDs are on but not flashing.	The Rugby is in an environment where it cannot operate without causing damage to the laser diode. This could be a result of heat from direct sunlight. Shade the Rugby from the sun. After two minutes in the alert condition, the unit will shut off automatically.

Problem	Possible Cause(s)	Suggested Solutions
The Rugby is working, but not self-levelling.	The Rugby is in Manual Mode.	The Rugby must be in Automatic Mode to self-level. Set the Rugby to Automatic Mode by pressing the Automatic/Manual Mode button. – In Automatic Mode the X-axis LED and the Y-axis LED flash green while levelling. – In Manual Mode the X-axis LED and/or the Y-axis LED are red.
Rugby does not turn on.	The batteries are low or dead.	Check the batteries and change or charge the batteries if necessary. If the problem continues, return the Rugby to an authorised service centre for service.
The distance of the laser is reduced.	Dirt is reducing the laser output.	Clean the windows of the Rugby and the receiver. If the problem continues, return the Rugby to an authorised service centre for service.
The laser receiver is not working properly.	The Rugby is not rotating. It may be levelling or in Elevation Alert.	Check for proper operation of the Rugby. ☞ Refer to the receiver manual for more information.
	The receiver is out of usable range.	Move closer to the Rugby.
	The batteries of the receiver are low.	Change the receiver batteries.
The Rugby cannot communicate with the RC400 Remote Control.	The Rugby 840 and the receiver have not been paired and cannot communicate with each other.	Pair the Rugby 840 and the receiver. Refer to "2.5.1 Pairing the Rugby 840 with the RC400 Remote Control" for more information.
Elevation Alert function is not working.	The Elevation Alert function is disabled.	The Elevation Alert function is enabled or disabled by pressing the following button combination: With Rugby turned on and rotating, press and hold the Left and Right Arrow buttons. Then press the Automatic/Manual Mode button to enable or disable the Elevation Alert function. The Rugby beeps once to indicate the change.
The Rugby does not turn on in Automatic Mode.	The Rugby is designed to always turn on in Automatic Mode unless specifically disabled by the user.	The Automatic Mode can be enabled or disabled by pressing the Automatic/Manual Mode button.

Problem	Possible Cause(s)	Suggested Solutions
The Rugby turns on with the last mode saved.	The Rugby is designed to always turn on in Automatic Mode unless specifically disabled by the user.	With the Rugby turned on and rotating, press the power button to turn the Rugby off. Press and hold both the Automatic/Manual Mode button and the power button for five seconds to enable or disable the function. The Rugby will beep once to indicate the change.

10 Care and Transport

10.1 Transport

Transport in the field

When transporting the equipment in the field, always make sure that you
- either carry the product in its original transport container,
- or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright.

Transport in a road vehicle

Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container and secure it.

Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

Shipping, transport of batteries

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company.

Field adjustment

Periodically carry out test measurements and perform the field adjustments indicated in the User Manual, particularly after the product has been dropped, stored for long periods or transported.

10.2 Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "11 Technical Data" for information about temperature limits.

Field adjustment

After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.

Li-Ion and alkaline batteries

For Li-Ion and alkaline batteries
- Refer to "11 Technical Data" for information about storage temperature range.
- Remove batteries from the product and the charger before storing.
- After storage recharge batteries before using.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.

For Li-Ion batteries
- A storage temperature range of -20°C to +30°C/-4°F to 86°F in a dry environment is recommended to minimise self-discharging of the battery.
- At the recommended storage temperature range, batteries containing a 50% to 100% charge can be stored for up to one year. After this storage period the batteries must be recharged.

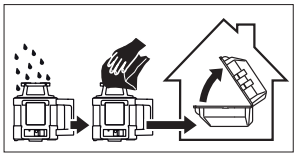
10.3 Cleaning and Drying

Product and accessories

- Blow dust off lenses and prisms.
- Never touch the glass with your fingers.
- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these can attack the polymer components.

Damp products

Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C /104°F and clean them. Remove the battery cover and dry the battery compartment. Do not repack until everything is completely dry. Always close the transport container when using in the field.



Cables and plugs

Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

11 Technical Data

11.1 Conformity to National Regulations

Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product Rugby 840 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

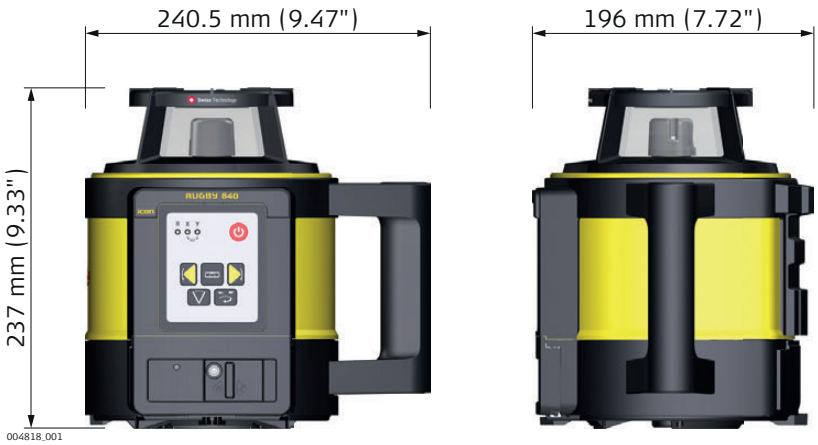
  CE Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EU Member state.
- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band	2400 - 2483.5 MHz	
Output power	< 100 mW (e. i. r. p.)	
Antenna	Rugby 840	Chip antenna
	Rod Eye 180, Digital RF Receiver	Chip antenna

11.2 General Technical Data of the Laser

Operating range	Operating range (diameter):	
	Rugby 840:	700 m/2300 ft
Self-levelling accuracy	Self-levelling accuracy:	±1.5 mm at 30 m (±1/16" at 100 ft)
	Self-levelling accuracy is defined at 25°C (77°F)	
Self-levelling range	Self-levelling range:	±6°
Rotation speed	Rotation speed:	0, 2, 5, 10 rps
Scanning modes	Scanning modes:	10°, 45°, 90°

Laser Dimensions



Weight

Rugby 840 weight with battery: 3 kg/6.6 lbs.

Internal battery

Type	Operating times* at 20°C
Lithium-Ion (Li-Ion Pack)	50 h
Alkaline (four D-cells)	40 h

*Operating times are dependent upon environmental conditions.

☞ Charging the Li-Ion battery pack takes a maximum of five hours.

☞ Use only high quality alkaline batteries to achieve operating time.

Environmental specifications

Temperature

Operating temperature	Storage temperature
-20°C to +50°C (-4°F to +122°F)	-40°C to +70°C (-40°F to +158°F)

Protection against water, dust and sand

Protection
IPX8 (IEC 60529) / MIL-STD-810G
Dust tight Protected against continuous immersion in water.

A100 Lithium-Ion charger

Type:	Li-Ion battery charger
Input voltage:	100 V AC-240 V AC, 50 Hz-60 Hz
Output voltage	12 V DC
Output current:	3.0 A
Polarity:	Shaft: negative, Tip: positive

A800 Lithium-Ion battery pack

Type:	Li-Ion battery pack
Input voltage:	12 V DC
Input current:	2.5 A
Charge time:	5 hours (maximum) at 20°C

11.2.1 RC400 Remote Control

Operating range	Operating range (diameter):	200 m/650 ft
Batteries	Batteries: Alkaline Battery life (typical usage)	Two AA-cells 70 hours
Remote Control Dimensions		

12 Lifetime Manufacturer's Warranty

Description

Lifetime Manufacturer's Warranty
Warranty coverage for the entire usage time of the product. Free charge repair or replacement for all products that suffer defects as a result of faults in materials or manufacturing, for the entire life of the product.

Five Years No Costs
Guaranteed service should the product become defective and require servicing under normal conditions of use, as described in the user manual, at no additional charge.

To receive the "five years no cost" period, the product must be registered at http://www.leica-geosystems.com/registration within 8 weeks of the purchase date. If the product is not registered, a two year warranty applies.

Description

Two Year Knockdown Warranty
In addition to the lifetime manufacturer's warranty and the five year no cost period for normal repairs, the internal self-levelling system of the Rugby 840 is covered regardless of failure. Should any accident or knockdown occur within the warranty period, all repairs to the internal self-levelling assembly will be covered under the knockdown warranty policy.

Accessories for power supply

A100 - Li-Ion Charger (790417)
The A100 Li-Ion charger comes complete with four separate AC adaptors.

A130 - 12 Volt Battery Cable (790418)
The A130 12 volt battery cable connects the Rugby to a standard 12 volt automotive battery as a backup for the unit's battery. It is only usable with the rechargeable battery pack. Length: 4 metres/13 feet.

A140 - Car Adapter Cable (797750)
The A140 car adapter cable connects the Rugby to a standard automotive accessory jack as a backup for the unit's battery or to charge in a vehicle. It is only usable with a rechargeable battery pack. Length: 2 metres/6.5 feet.

A150 - Alkaline Battery Pack (790419)
The A150 alkaline battery pack is included as part of the standard alkaline package. It can also be purchased separately to be used as a backup for rechargeable models. Batteries required: Four D-cell type alkaline.

A170 - Solar Panel Kit (790420)
The A170 solar panel kit runs and charges the Rugby. It is usable only with a rechargeable battery pack. The A170 solar panel comes complete with its own storage bag that can be attached directly to the Rugby carrying case.

A800 - Li-Ion Battery Pack (790416)
The A800 Li-Ion battery pack is included as part of the standard rechargeable package. It can also be purchased separately as an upgrade to the alkaline battery pack. It is necessary to also purchase the A100, Li-Ion battery charger to complete the Li-Ion battery solution.

A200 - Wall Mount Bracket (790421)
The A200 wall mount bracket mounts the Rugby 840 securely to the ceiling grid for suspended ceiling installations.

A210 - Ceiling Grid Target (732791)
The A210 ceiling grid target attached magnetically to the ceiling grid for suspended ceilings installations.

A220 - Batter Board Clamp with Adapter (790432)
The A220 batter board clamp and adapter provides the user with a simple, string free set up on batter boards. The 90° receiver adapter attaches to the main clamp for easy storage when not being used. Refer to "5.4.4 Batter Boards" for specific application information.

A280 - Facade Adapter Kit (799204)
The A280 facade adapter kit provides the user with a useful setup for facade installations. The kit consists of two facade adapter brackets and a batter board clamp with the 90° receiver adapter. Refer to "5.4.5 Facades" for specific application information.

A100

A150

A170

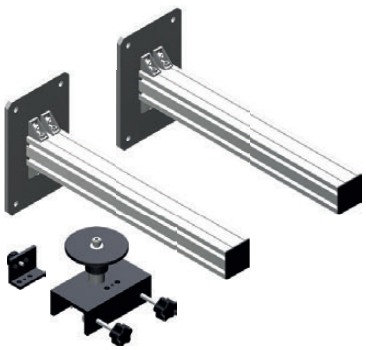
A130

A140

A800

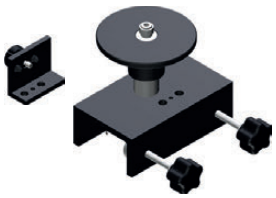
A200

A280



A210

A220



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Total Quality Management: Our commitment to total customer satisfaction.

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica Geosystems dealer/sales representative for more information about our TQM program.

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- when it has to be **right**

Leica Geosystems